ThermaVault Components Research

Solar Panels (Jayal)

We should use the 'AuREUS' solar panels. These panels are made up of vegetables and fruits which turns the ultraviolet rays of the sun into electricity.

These panels can generate electricity anywhere, even where sunlight is not present as the uv light is everywhere instead of night.
These panels are the sustainable way of producing electricity and are also much more efficient than the regular solar panels.
A single prototype panel was demonstrated to generate sufficient power to charge two phones per day, an amount in the 40–60 watt range, depending on sunlight conditions.
Perhaps such panels may not be available readily in the Market or for cheap prices too.

Insulated Box

We will be using Conductive Metal Plates on the Inside of the Box and 3D Printed Plastic Enclosing to insulate it from the Outside Environment.
It will be 10-15 cm in length on each side (So about 1 m^3 available volume).
We decided these dimensions and 3D printed walls because they will lead to the best Thermal Insulation (According to us)

Heating/Cooling Device

We will be using 1-2 Peltier Modules (TEC-12706) [About 90 Watts per Module] [Max Voltage at 12 VDC and Max Current at 6.4 Amps)

Microcontroller and Temperature Sensor Circuits

We will be using a Microcontroller (Arduino/ESP32) and 1-2 Temperature Sensors (DHT-11) embedded into the Inside of the Insulate Box to measure the current temperature of the inner environment.
The Temp sensors will feed the data back to the Microcontroller and the User can set a certain required temperature for the device which will also be fed to the Controller.
The controller than through relays periodically cuts and revives power to the Peltier Modules to maintain the temperature within the box (Using the temp sensor as a feedback loop).

[Optional: Can also include LCD Display for User Convenience)

Heatsink & Fan system

Heatsinks with Fans will be added to the "Heating side" of the Peltier Module to evacuate the heat generated by the modules and help them maintain the Cool environment within.
These Heatsinks are passive Heat Dissipators and The Fans will turn on simultaneously by the Microcontroller when Power to the Peltier Modules is revived.

(Lithium-Ion Battery Capacity Research Pending)